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LEPYRONIA COLEOPTRATA (L.), A EUROPEAN SPITTLEBUG IN EASTERN NORTH AMERICA: NEW LOCALITY RECORDS AND NEW KEY TO THE NORTH AMERICAN SPECIES OF *LEPYRONIA* AMYOT AND SERVILLE (HOMOPTERA: CERCOPIDAE)

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Abstract.—Recognition features, known distribution, predators, host plants and other aspects of the biology of the introduced Palearctic species, *Lepyronia coleoptrata* (L.), are discussed. New locality records in eastern North America are listed and mapped. A brief diagnosis of the last-instar nymph is given, and a new key to adults of the species of *Lepyronia* in North America is provided. Photographs of the dorsal and lateral habitus of *L. coleoptrata* and the lateral habitus of the three native species are provided. The male genitalia of all species of *Lepyronia* occurring in North America are illustrated.

The spittlebug genus *Lepyronia* Amyot and Serville is represented in America north of Mexico by the native species *angulifera* Uhler, *gibbosa* Ball, and *quadrangularis* (Say), and by *coleoptrata* (L.), an introduced species. The presence of *L. coleoptrata* in North America was first verified by Russell (1962), based on a collection of specimens from various localities in New York State in 1955 and 1961. Those specimens collected in 1961 were submitted for identification by D. D. Hardee, Cornell University, Ithaca, New York.

Previous to Russell (1962), several authors reported *L. coleoptrata* from North America, but these earlier records cannot be confirmed. Oshanin (1906), the first to report *L. coleoptrata* in North America, provided the record "Regio nearctica (America septentrionalis)." A Palearctic and Nearctic distribution for *L. coleoptrata* is also listed in other European works, e.g., Lallemand (1912), Haupt (1922), and Holgersen (1944). In the North American literature, Van Duzee (1917) provisionally listed *L. coleoptrata,* commenting "Oshanin credits this species to North America, but I am unable to trace his authority. If found here it is probably Alaskan." Doering (1930), who provided the first comprehensive review of the North American species of *Lepyronia,* apparently did not examine examples of *coleoptrata.*

Each of the three native species of *Lepyronia* are reasonably well known and aspects of their biology have been discussed by a number of North American workers (Doering, 1923, 1930, 1942; Garman, 1923; Hanna and Moore, 1966). *Lepyronia angulifera,* the smallest North American species (4.0–6.1 mm long), is

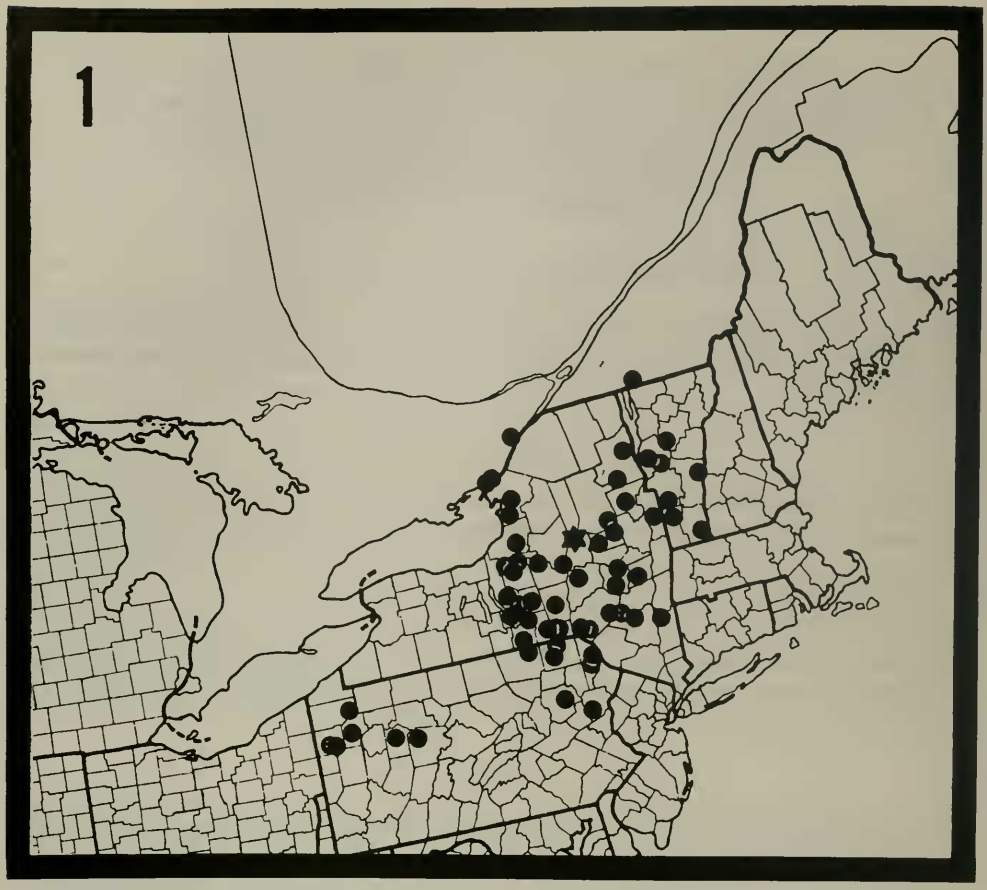


Fig. 1. Known distribution of *Lepyronia coleoptrata* in eastern North America (based on records presented herein; earliest record seen from Cold Brook, N.Y., in 1940 (star)).

found chiefly along the coastal areas of eastern United States from Massachusetts to Florida and from the Great Lakes region (Hanna and Moore, 1966). *Lepyronia gibbosa,* the largest North American species (6.9–9.6 mm long), is found primarily in the central and western U.S., with populations known from the relict prairies of Michigan (Hanna and Moore, 1966). The most commonly collected and widespread species in eastern North America is *L. quadrangularis* (5.8–8.5 mm long).

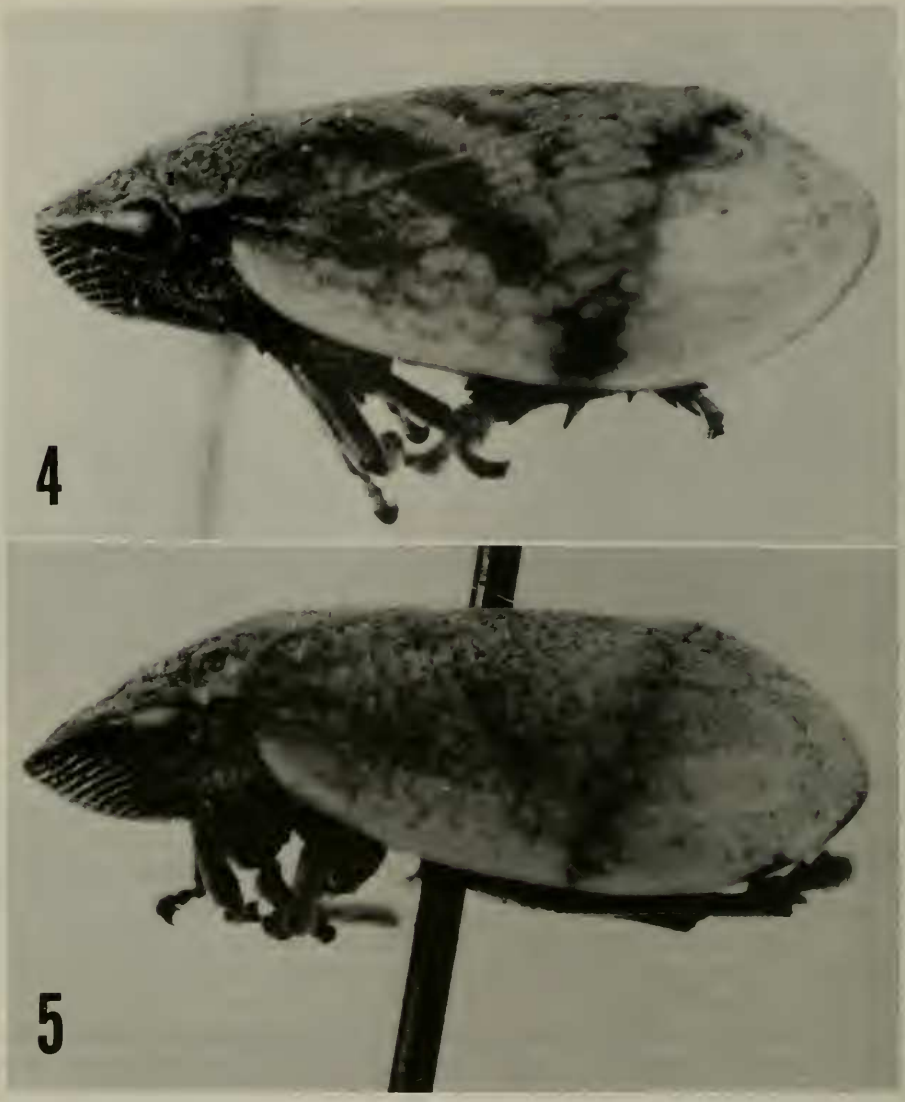
Russell (1962) provided the only detailed information for separating *L. coleoptrata* from the other North American species of *Lepyronia. Lepyronia coleoptrata* (Figs. 2, 3) may easily be distinguished by the broadly curved anterior margin of the head, by the distinctly wider than long tylus, by the strongly inflated frons (Fig. 4), and by the male genitalia (Fig. 8). Because *L. coleoptrata* closely resembles *quadrangularis* in size (5.3–7.9 mm long) and dorsal markings, the two species may be confused; in fact, specimens of *coleoptrata* have been found intermingled with those of *quadrangularis* in various collections in eastern North America.

Figs. 2–3. *Lepyronia coleoptrata*, dorsal habitus of adult. 2, Male. 3, Female.

In the Old World, *L. coleoptrata* is a common and widespread species, occurring throughout Scandinavia; western, central, and southern Europe; northern Africa; and most of Asia (including Asia Minor, China, Russia, Korea, and Japan) (Metcalf, 1962).

New North American records of *L. coleoptrata* have resulted from the USDA-APHIS "High Hazard Pest Survey" program, examination of Cornell student collections now incorporated in the University collection, examination of several institution and university collections in the eastern U.S. and Canada, collections made by or communicated by A. G. Wheeler, Jr. (Pennsylvania Department of Agriculture, Harrisburg, Pa.), and authors' personal collecting. In the list below, the following acronyms identify those collections (institution or personal) from which new records were obtained: USNM (National Museum of Natural History, Washington, D.C.); CNC (Canadian National Collection, Ottawa); CUIC (Cornell University Insect Collection); AGW (A. G. Wheeler, Jr.); ERH (E. R. Hoebeke); and KGAH (specimens observed in the field by K. G. A. Hamilton, but not retained). The USDA-APHIS "High Hazard Survey" program is identified by the acronym (HHS). Collections of the American Museum of Natural History, New York, N.Y., the New York State Museum and Science Service, Albany, N.Y., and The Pennsylvania State University, University Park, Pa., also were checked closely, but no specimens of *L. coleoptrata* were discovered.

Nine New York counties (Broome, Cortland, Delaware, Herkimer, Lewis, Montgomery, Onondaga, Saratoga, and Schenectady) were listed by Russell (1962) as the first confirmed North American records for *L. coleoptrata*. The following



Figs. 4–5. Species of North American *Lepyronia,* lateral aspect. 4, *L. coleoptrata.* 5, *L. gibbosa.*

records extend the known distribution of *L. coleoptrata* in northeastern North America (Fig. 1). The earliest record of *L. coleoptrata* available to us was a specimen collected at Cold Brook, N.Y. (Herkimer Co.) in 1940 (represented by solid star in Fig. 1).

UNITED STATES: NEW YORK: *Albany Co.,* Rensselaerville, July, 1965 and 1980 (CUIC). *Broome Co.,* Binghamton, July, 1979 (KGAH); Windsor, July, 1979 (KGAH). *Cayuga Co.,* Genoa, July, 1974 (CUIC). *Chenango Co.,* Oxford, July, 1975 (CUIC). *Cortland Co.,* Cortland, September, 1980 (CUIC). *Delaware Co.,* Cadosia, June and July, 1977, ex: weeds and parsnip (AGW); East Branch, July, 1979 (KGAH); Hale Eddy, July, 1979 (KGAH); Margaretville, July, 1979

(KGAH). *Dutchess Co.*, Barrytown, July, 1979 (KGAH). *Essex Co.*, Elizabethtown, July, 1979 (KGAH); Schroon Lake, July, 1979 (KGAH). *Fulton Co.*, Sacandaga, July, 1979 (KGAH). *Hamilton Co.*, Wells, July, 1979 (KGAH). *Herkimer Co.*, Cold Brook, June, 1940 (CUIC). *Madison Co.*, Sullivan, August, 1978, ex: corn (HHS). *Onondaga Co.*, Cicero, July, 1979 (KGAH); Plainville, July, 1979 (KGAH); Westvale, June, 1964 (CUIC). *Schoharie Co.*, Esperance, July, 1979 (KGAH); North Blenheim, July, 1979 (KGAH); Sloansville, July, 1955 (CNC); county label only, July, 1974 (AGW). *Tioga Co.*, Lounsberry, July, 1979 (KGAH); Richford, July, 1960, ex: *Asclepias syriaca* (CUIC). *Tompkins Co.*, Brooktondale, July, 1975, ex: *Chrysanthemum leucanthemum* (CUIC); Ithaca, September and October, 1979 and 1981 (CUIC); McLean, June, 1975, 1977, 1978 and July, 1976 (CUIC); Ringwood, July, 1978 (CUIC); Salmon Creek Valley, July, 1980, and June, 1981 (ERH); Virgil, July, 1964 (CUIC). *Ulster Co.*, Boiceville, July, 1979 (KGAH); Highmount, July, 1979 (KGAH). *Washington Co.*, county label only, July, 1971, ex: weeds (CUIC).

The following New York localities, obtained from specimens in the USNM collection, were not listed by Russell (1962), although they were originally collected by D. D. Hardee in July, 1961: *Albany Co.*, Berne. *Chenango Co.*, North Norwich. *Essex Co.*, Minerva. *Fulton Co.*, Oppenheim. *Jefferson Co.*, [Pierrepont] Manor? *Oneida Co.*, Bridgewater. *Oswego Co.*, West Amboy. *Otsego Co.*, West Exeter. *Schoharie Co.*, Livingstonville. *Warren Co.*, The Glen. *Washington Co.*, Argyle.

PENNSYLVANIA: *Bradford Co.*, Windham Twp., August, 1979, ex: hay (HHS). *Clearfield Co.*, nr. Dubois, August, 1981 (AGW). *Crawford Co.*, Titusville, August, 1981 (AGW). *Jefferson Co.*, Brookville, August, 1981, (AGW). *Luzerne Co.*, Rice Twp., July, 1981, ex: sweeping vegetation (AGW). *Mercer Co.*, Grove City, June, 1979 (AGW); Mercer and Cool Spring Twp., August, 1981 (AGW). *Monroe Co.*, Kresgeville, August, 1979, ex: corn (HHS). *Susquehanna Co.*, Dimock, August, 1979, ex: hay (HHS); Great Bend, July, 1981, ex: sweeping vegetation (AGW). *Venango Co.*, Polk, August, 1981 (AGW). *Wayne Co.*, Damascus Twp., July, 1981, ex: *Rhododendron* (AGW); Cherry Ridge Twp., July, 1979, ex: mixed hay (HHS).

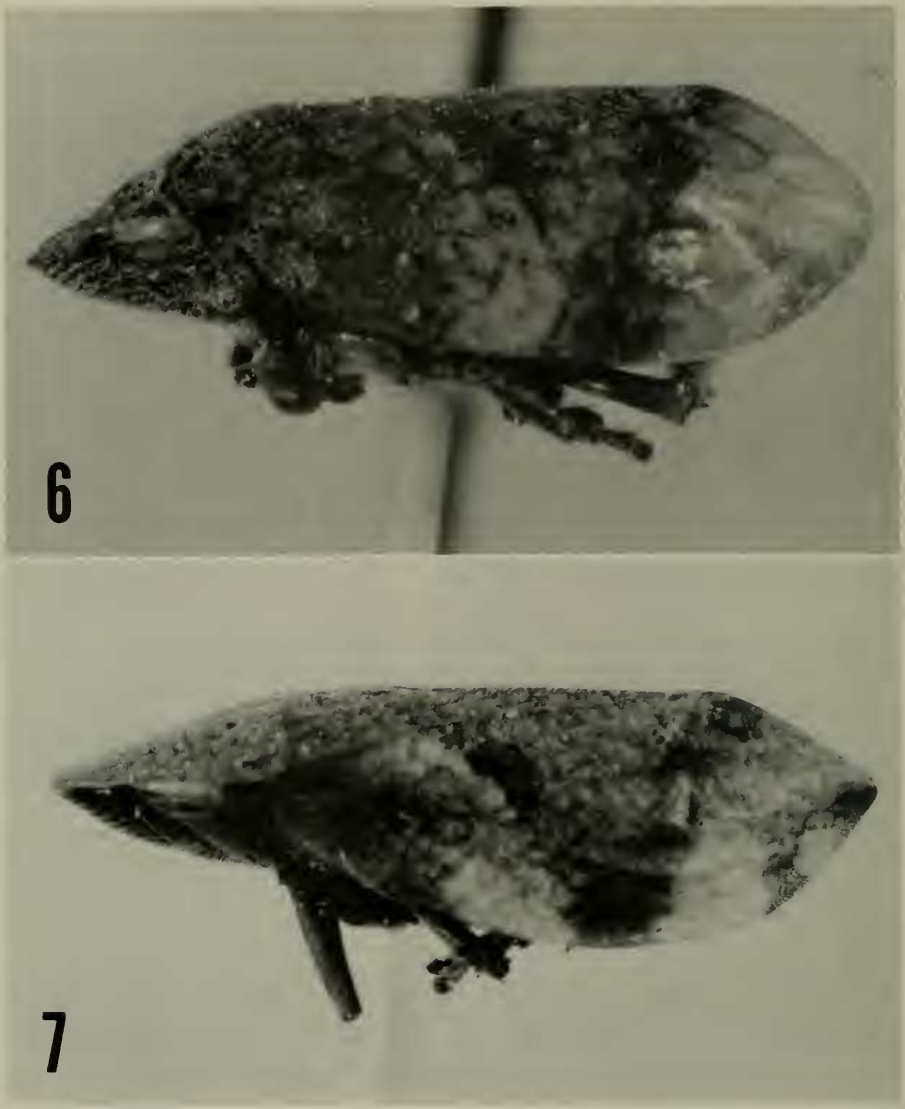
VERMONT: *Addison Co.*, Bridport, June, 1979 (KGAH); Hancock, July, 1979, ex: chickory (CNC); Ripton, July, 1979 (KGAH); Shoreham, June, 1979 (KGAH). *Bennington Co.*, Manchester Depot, June, 1979 (KGAH). *Rutland Co.*, Pawlet, June, 1979 (KGAH). *Washington Co.*, Warren, July, 1979 (KGAH). *Windsor Co.*, White R. Jct., July, 1979, ex: wild strawberries (CNC).

CANADA: ONTARIO: *Grenville Co.*, Spencerville, July, 1979 (CNC). *Leeds Co.* (Thousand Islands), Georgina Isl., August, 1976 (CNC); Grenadier Isl., July, 1975 (CNC); Hill Isl., July, 1979 (KGAH); Mulcaster Isl., June, 1975 and September, 1976 (CNC).

QUEBEC: Frelighsburg, June, 1976, ex: weeds (CNC).

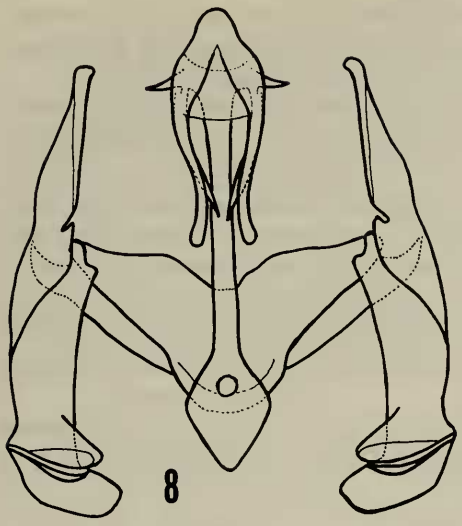
Information on the bionomics and seasonal history of *L. coleoptrata* is available primarily from the European literature. The species is univoltine with adults found from late June to early September (Dlabola 1954; Ossiannilsson 1981). It overwinters in the egg stage (Müller 1957) or in the nymphal stage (Kuntze 1937).

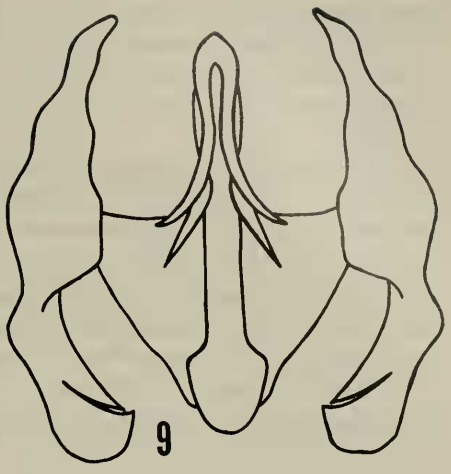
Lepyronia coleoptrata is a general feeder, with numerous host plants recorded in the literature. Haupt (1935) listed willow spp. (*Salix*) and the labiate *Teucrium chamaedrys* L. as food plants. The legume *Spartium junceum* L. and certain

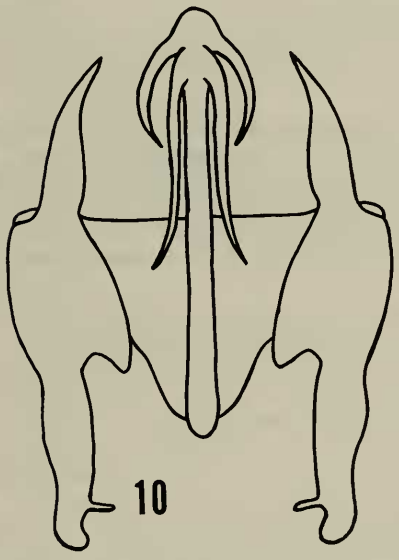


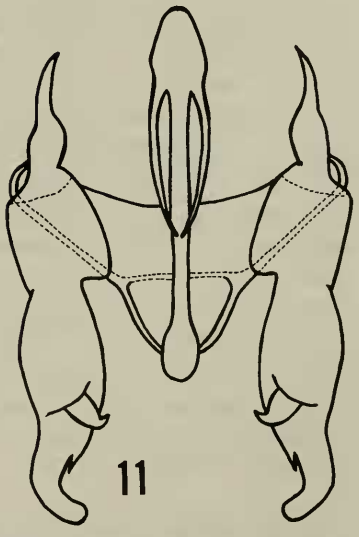
Figs. 6–7. Species of North American *Lepyronia*, lateral aspect. 6, *L. angulifera*. 7, *L. quadrangularis*.

cultivated herbs (including salvia and rosemary) have been recorded as hosts (Silvestri, 1934), while Alkhazishvili (1953) listed cotton (*Gossypium* spp.). Ossiannilsson (1951) provided an exhaustive list of host plants, which included various woody phanerogams (*Salix* spp., especially *S. repens* L.; *Populus tremula* L.; *Betula pubescens* Ehrh.; *Corylus avellana* L.; *Vaccinium myrtillus* L. and *V. uliginosum* L.) and many herbaceous phanerogams (*Carex* spp. and other grasses; species of *Trifolium, Potentilla, Filipendula, Galium, Plantago, Taraxacum* and many others). Linnavuori (1949) added *Phragmites, Solanum dulcamara* L., and *Caltha palustris* L. to the list of host plants. *Lepyronia coleoptrata* was one of









Figs. 8–11. Species of North American *Lepyronia,* male genitalia. 8, *L. coleoptrata.* 9, *L. gibbosa.* 10, *L. angulifera.* 11, *L. quadrangularis.* (Figs. 9–11 redrawn from Doering, 1930.)

several homopterans occurring regularly on alfalfa (lucerne) in Yugoslavia in 1962 (Tanasijevic, 1964). Additional host plant data taken from specimens used in the present study include: brome grass, timothy grass, red and alsike clover, alfalfa, corn, hay, oats, parsnip, *Asclepias syriaca* L., *Chrysanthemum leucanthemum* L. and *Rhododendron.*

At Hancock, Vermont, adults of *L. coleoptrata* were taken (by KGAH) together with nymphs, which had formed many spittle masses on chickory (*Cichorium intybus* L.), including several on single stems. The spittle masses were generally

supported by the leaf axils. No masses were observed on the many other weeds, grasses and trees in the area, which appears to indicate a strong food preference for the immatures. The adults, by contrast, were not confined to chickory.

Few parasites or predators of *L. coleoptrata* have been recorded. Grandi (1934) reported that in Italy the nyssonine sphecid *Stizus tridens* F. provisions its nest with this cercopid.

Ossiannilsson (1951) provided a key to separate the nymphal stages of six species (including *L. coleoptrata*) of Cercopidae found in the region of Uppsala, Sweden. The dorsal habitus of the last-instar nymph of *coleoptrata* also was illustrated in Ossiannilsson (1951, 1981). The nymph can be characterized by the following diagnosis: head and thorax sharply marked with black, anterior margin of head also marked with a broad black, transverse stripe, and abdomen with a distinct, light, median stripe throughout its length.

The following new key to adults of North American *Lepyronia,* incorporating those characters that are easiest to use, is drawn predominantly from the characters and measurements given by Russell (1962).

Key to North American Species of *Lepyronia*

1. Frons moderately to strongly inflated in profile (Figs. 4, 5); elytron strongly curved on costal margin, narrowly curved at apex 2
– Frons flattened or weakly inflated (Figs. 6, 7); elytron moderately curved on costal margin, angular at apex 3
2. Frons strongly inflated (Fig. 4); anterior margin of head broadly curved; elytron usually with a dark brown to blackish V-shaped design with both anterior and posterior arms uniform in width; light to dark brown dorsally, predominantly dark brown to black ventrally; length 5.3–7.9 mm; male genitalia as in Fig. 8; a Palearctic species, in North America known only from Quebec to Pennsylvania ..... *coleoptrata* (L.)
– Frons moderately inflated (Fig. 5); anterior margin of head narrowly curved; elytron usually without a distinct V-shaped design, or else anterior arm narrower than posterior arm, or broken, or obscure; light to dark tawny or grayish dorsally, predominantly tawny to dark brown ventrally; length 6.9–9.6 mm; male genitalia as in Fig. 9; known primarily from central and western U.S. ..... *gibbosa* Ball
3. Small species, 4.0–6.1 mm long; medium to dark brown dorsally and ventrally; elytron usually with a light spot slightly before, and one at, apex; male genitalia as in Fig. 10; known from coastal areas of eastern U.S., from Massachusetts to Florida; also known from Michigan ..... *angulifera* Uhler
– Large species, 5.8–8.5 mm long; tawny to dark brown or grayish dorsally and ventrally; elytron usually with a dark brown V-shaped design, with anterior arm sometimes broken or obscure; male genitalia as in Fig. 11; widespread throughout eastern N. America ..... *quadrangularis* (Say)

Acknowledgments

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